ECONOMIC IMPACT OF STATE RECYCLING MARKET DEVELOPMENT PROGRAMS

1990-2023

AMERIPEN®

Executive Summary

Background

In the 1990s, the U.S. Environmental Protection Agency (EPA) launched a program called "Recycling Means Business: EPA's Market Development Strategy" to help match recycling capacity with the growth in curbside recycling. This program focused on providing states with the resources needed so they could offer business development and technical assistance to encourage companies to invest in recycling markets that, at the time, were considered an emerging and risky enterprise. The EPA's program was instrumental in launching many state recycling market development resource centers still operating today. Yet in the 2000's, as recycling grew into a more global market, domestic investment dropped and the EPA support for market development also waned.

In 2021, in response to significant shifts again in the global market, as well as changing curbside materials, the EPA released a **National Framework for Advancing the US Recycling System** and once again called out interest in supporting state recycling market development efforts. This aligned with an increasing interest by states to create and fund these centers, with three states establishing new centers by 2022[1]. At the same time, private investment has been funneling into collaborative efforts like The Recycling Partnership, Closed Loop Partners, the Carton Council and others to help fund increased and better-quality recycled materials. In 2021, Maine was the first state to pass an extended producer responsibility (EPR) law for packaging. Three other states followed within a year.[2] As increased interest grows in how we manage packaging materials at their end of life and how we can stimulate and support packaging recycling, AMERIPEN began to work closer with recycling market development programs to understand how we can close the gap between design and recycling to ensure packaging circularity. Our efforts launched a task force made up of seven different state organizations. This group has evaluated corporate recycled content goals against available supply and domestic recycling capacity and developed a best practice guide for establishing state recycling market development centers. As interest in investing in our domestic recycling system grows, AMERIPEN and our partners in the recycling market development centers felt it would be worthwhile to evaluate the economic impact of these centers. While each program tends to evaluate their unique program for economic and environmental impact, there has been no national study undertaken to evaluate how effective these programs are and how we could better leverage them to meet our emerging goals for increased domestic recovery of packaging. To the best of our knowledge this is the first study of its kind.

Economic Impact of State Recycling Development Centers

Our data shows that recycling market centers have been associated with the generation of nearly 260,000 full-time equivalent (FTE) jobs over the past 33 years. With state supplier data and other impacts included, that number balloons to over 990,000 FTEs during the same period. Direct impact businesses have paid employees wages totaling nearly $22.2 billion and have generated economic activity of over $89.5billion. With state supplier data and other impacts included, total wages balloons to nearly $77 billion and total economic activity to nearly $280 billion.

The study also notes that some materials are better represented in this growth,

[1] Washington State, Maryland and New Jersey.
[2] California, Colorado and Oregon.

with municipal recycling facilitation or sortation centers appearing to benefit the most from recycling market centers, indicating there is an interest in locating in states that have an emphasis on recycling.

Additionally, the study uncovered a strong correlation between states with higher gross domestic product (GDP) tending to invest in recycling development—indicating that there is a strong correlation between business concentration and an interest in recycling which could open up further exploration on how best to align state interests with business needs.

One of the arguments frequently promoted for increased recycling investment is the rapidly changing material stream. Recycling systems, originally designed in the 1990s, are now outdated, with many lacking the means to process increased plastics, lighter weight materials and new packaging formats. Developing end markets and supporting shifts to sorting and reprocessing so the quality of recyclable feedstock remains high will be a continued need as long as innovation remains central to business. The data indicates that job growth is, for the most part, correlating with the shifts in curbside recyclables. Although not the highest employer, the greatest areas of job growth is in plastics, which also coincides with some of the fastest growing recyclable streams.

Better Data is Needed

This analysis was dependent on somewhat limited data made available from existing state recycling market centers, often supported by government through different grants and state budget appropriations. While this analysis shows a positive impact of recycling market centers over time, it is not correlated with the budgetary expenditures and staffing effort put into them. Without knowing data related to the size and scope of the programs offered by each state recycling market center, and the industries that they are targeting in each state, it is impossible to determine the nuances behind program success. For example, it is currently unknown if budget matters, if programs are targeting certain materials, etc.

If more information on the characteristics and underlying data of these operations were made available, it might be possible to determine best practices and how other industries might benefit from state recycling market development centers.

Conclusion

Based on a thorough analysis of available data, development of state recycling market centers has helped states attract recycling businesses, particularly in sectors like paper and paperboard manufacturing, and metals smelting and production. This suggests that much like other state economic development programs, assistance such as grants, tax forgiveness, technical services and research and development can help encourage recycling dependent businesses to locate in specific areas – particularly those industries at the margin.

As packaging materials and sectors seek to advance circularity, state recycling market development centers offer a unique skill set that matches state resources with private interests to advance an industry. When these centers collaborate with industry to drive resources to areas of need, we can collectively benefit and create a more circular economy.

AMERIPEN®

What is Recycling Market Development?

Recycling market development is the process of creating and expanding markets for recyclable materials. This involves finding new uses and applications for recyclable materials, as well as developing new technologies and processes to make recycling more efficient and cost-effective. The goal of recycling market development is to increase the demand for recyclable materials, which in turn helps to reduce waste, conserve natural resources, and support sustainable economic growth.

There are many different stakeholders engaged in recycling market development, resulting in a wide variety of models. Industry groups create material specific coalitions to help encourage recovery of specific materials, or products. Investors coalesce around specific goals, while state and federal government may be involved through various mechanisms. What makes state recycling market development centers unique is their connection between state agencies (usually environmental and commerce departments) so that they can support and promote economic growth at the state level.

Recycling market development had a first wave of momentum in the early 1990s. This included a federal strategy initiated by the U.S. Environmental Protection Agency (EPA) called "Recycling Means Business" and focused on creating jobs through support of recycling businesses. Some of the earliest state-led recycling market development programs were established during this period, including programs in North and South Carolina, Minnesota, New York, and Washington. Over the past three decades, most states have had some form of a recycling market development program, however, resourcing and support for these programs have fluctuated over time. Washington State, for example, had one of the first programs in the 1990s, but the program was shuttered a decade later as exports for recycling grew. The center was re-established again in 2020, through legislation, to stimulate domestic markets and reduce reliance on exports.

Interest in recycling market development is again a growing area of interest amongst state governments, and to some extent at the federal level. Between China's restrictions on recyclable imports, COVID supply chain challenges, public awareness of mismanaged recyclables resulting in increased ocean pollution and an increased focus on reducing material demand and greenhouse gases, states are recognizing that the recycling industry can be an effective economic development engine with environmental and social benefits.

Other Stakeholders Involved in Recycling Market Development

State agencies are not the only stakeholders involved in recycling market development. Many industry groups, communities and or investors have created initiatives to also support recycling market development. Some of these entities include:

- **The Recycling Partnership (TRP)** is a national non-profit that works to improve recycling in the US. They invest in collection and processing infrastructure with a focus on some packaging specific materials. They also offer research and policy engagement. TRP is funded by corporate memberships—predominately from packaging manufacturers and consumer brands.

- **Closed Loop Partners (CLP)** is an industry collaborative that brings together entrepreneurs, investors established corporations, banking institutes and municipalities to help advance a circular economy. Split into three distinct businesses. CLP serves as a research organization, investor and business developer to help recycled markets.

- **National Recycling Coalition (NRC)** is an association of affiliated state recycling organizations who seek to promote and advocate for recycling. They invest in workshops to help promote market development as well as develop tools and resources to support affiliates.

- **Carton Council of North America (CCNA)** is a not-for-profit trade organization that advocates for and invests in increased food and beverage carton recycling. It is funded 100% by the carton manufacturing industry.

- **Polycoated Paper Alliance** is a recent initiative funded by polycoated paper manufacturers to advocate for, invest in and support the development of polycoated paperboard markets.

- **State Recycling Alliances** are usually made up of staff from recycling centers or agencies, these alliances seek to promote the value of recycling and help create collaboratives to advance recycling markets as well as reduce contamination.

- **Other** forms of recycling market development may include specific research projects or pilots by industry groups to address a specific need or efforts by zero waste associations to help promote reuse.

As of 2023, there are seven state specific programs[1] and two regional collaboratives[2]. Each program has created their own model depending on how the legislation to develop them was crafted, who is involved and/or local needs and infrastructure.

While each program is unique, typical activities for these centers may include:

- Supporting businesses that use recyclable materials or are part of the supply chain.
- Bringing together actors and resources that facilitate collaboration and partnership.
- Identifying and overcoming technical, logistical, and economic barriers that are inhibiting growth of recycling markets.
- Providing expertise and decision support tools to drive and coordinate strategies throughout the system.
- Working to achieve positive environmental and economic outcomes.

Case Study: Michigan State Market Development and Market Development Grants

In 2019, Michigan established the Renew Michigan Fund to support materials management within the state and to obtain a 45% recycling goal. The economic impact of tripling the recycling rate to 45% is expected to create 138,000 new jobs, provide $9 billion in annual labor income and $33.8 billion in economic output. To meet these objectives, the state requires $800M to $1B in capital investment to grow markets, increase collection and improve quality.

The Michigan Department of Environmental Quality (EGLE) has launched funding for existing recycling programs through Renew infrastructure grants and developed an accelerator program, Next Cycle Michigan, which supports the development of new end markets for materials within the state. Since the program launch in 2019, the state has seen a 35.4% increase in its recycling rate and nearly doubled community access to recycling. A 2022 analysis indicated that for every $1 that EGLE provides in grants from its Renew Michigan and Next Cycle Michigan recycling initiatives, the return on investment in additional spending by private businesses, local governments, and nonprofits is $10. Next Cycle alone has established over 213 projects supported by over 133 partners -promoting the vibrancy of recycled end markets within the state.

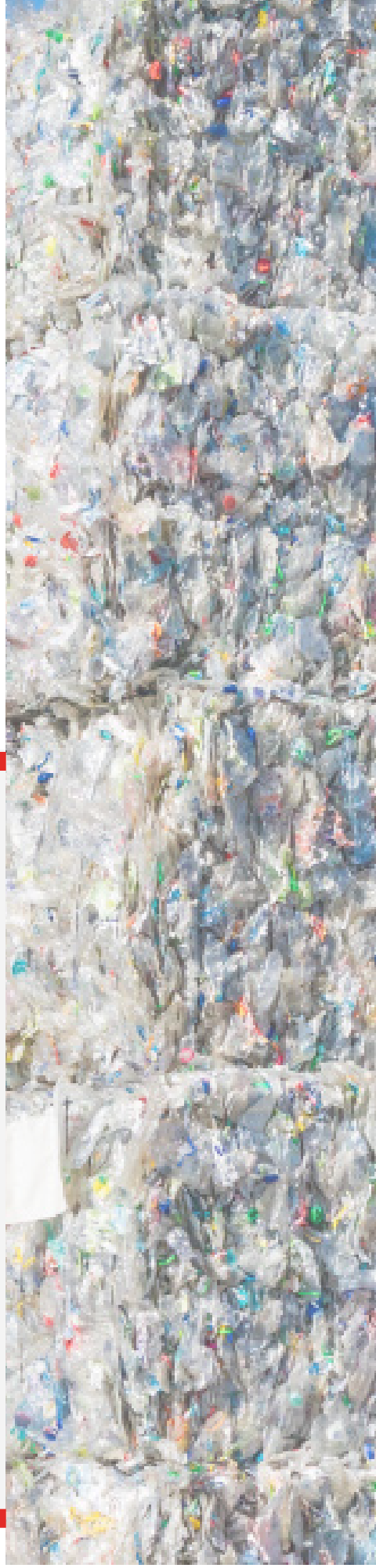
[1] Maryland, Michigan, Minnesota, New Jersey, Pennsylvania, South Carolina, Washington.

[2] Northeast Recycling Council (NERC) and Southeast Recycling Development Council (SERDC).

In November 2020, the EPA release its Draft National Recycling Strategy which also called for increased engagement with state recycling market initiatives as well as more regional and, where warranted, federal support. The EPA noted "the U.S. recycling system—including the collection, processing, recycling and manufacturing of materials into new products is facing challenges, including changes to international markets, waste streams and processing infrastructure that has not kept pace with evolving materials. Understanding the link between recycling, job growth and the economy will be an important element in addressing these challenges."

Most state programs have economic impact assessments, industry collaboratives produce impact reports, and the EPA and the Institute of Scrap Recycling Industries (ISRI) have both performed impact assessments on the recycling industry at-large. However, there is no data to help understand the cumulative economic impact state programs have.

In 2022, AMERIPEN engaged John Dunham and Associates (JDA) to perform an economic impact assessment on state recycling market development centers. To the best of our knowledge, .this is the first national assessment of the economic impact of state recycling market development centers.



Case Study: South Carolina Recycling Market Development

Established in 1991, the Recycling Market Development staff at the South Carolina Department of Commerce provides business matchmaking support, administers one-on-one materials management consultation, works with existing and emerging markets for materials, and tracks the economic impact of the recycling industry.

Recycling is a green growth industry in South Carolina, home to over 300 recycling companies including collectors, processors, recycled product manufacturers and equipment makers. The economic impact of recycling now exceeds $13.6 billion. In addition, the recycling industry can scale up employment at a higher rate than the average South Carolina industry, with an employment multiplier of 2.4. This means for every 10 jobs in recycling, there are 14 others created in the state's economy.

In 2022, South Carolina's recycling industry continued to grow, with 10 new or existing companies, $4.2 billion in capital investments, and 1,852 new jobs, according to the South Carolina Department of Commerce's Recycling Market Development Advisory Council.

Methodology

State recycling market development programs often address a wide range of materials, including packaging, textiles, construction and demolition debris and electronics. AMERIPEN, as a packaging specific trade association, was primarily interested in the impact of these programs on packaging because that is the association's focus and also because packaging and paper products are the primary materials in curbside recycling programs. Understanding if and how these programs can support curbside recycling is an essential insight into AMERIPEN's efforts to advance packaging circularity. We also looked at individual economic studies done by states with recycling market development programs to mirror closely what they identified as recyclable materials, and specifically, to match the packaging specific North American Industry Classification System (NAICS) codes they used.

This study evaluated 24 recycling dependent industries predominately emphasizing packaging and related materials using the NAICS codes for the assessment. NAICS codes group industries according to similarity in the processes used to produce goods or services. With the rapid innovation in packaging, these are not always accurate and may include material for formats much broader than those identified as recyclable, but they are the best standardized methodology available. Please refer to Figure 2: NACIS Industry Classification to see how materials were categorized.

The analysis also included electronics since, like packaging, they are also a focus of extended producer responsibility (EPR) schemes and consumer concern, and they share some of the same reprocessing technologies and processes. While some recycling market development centers include composting support services, for the purposes of this study, composting and compostable packaging was not included, since they were not services originally offered in the 1990s when these programs initially launched.

While the scope of the study examined 24 specific industries, there was a potential for serial correlation between them. This means that it was not recommended to simply aggregate jobs across all 24 sectors and use that as the dependent variable in the models. Industries were classified into seven (7) broad material specific categories shown in Figure 1: electronic scrap, packaging services, waste management, metals, glass, paper and plastic. Industry size across the U.S. is shown in Figure 1 for each of these categories. This gave a sense of industry size and it was anticipated could help assess program impact for material specific end markets. Note that material categories are not always inclusive of packaging. Since recyclable content can go into many end markets it was difficult to perfectly allocate towards packaging only products.

Figure 1
Industry Classification by Total Jobs in 2021

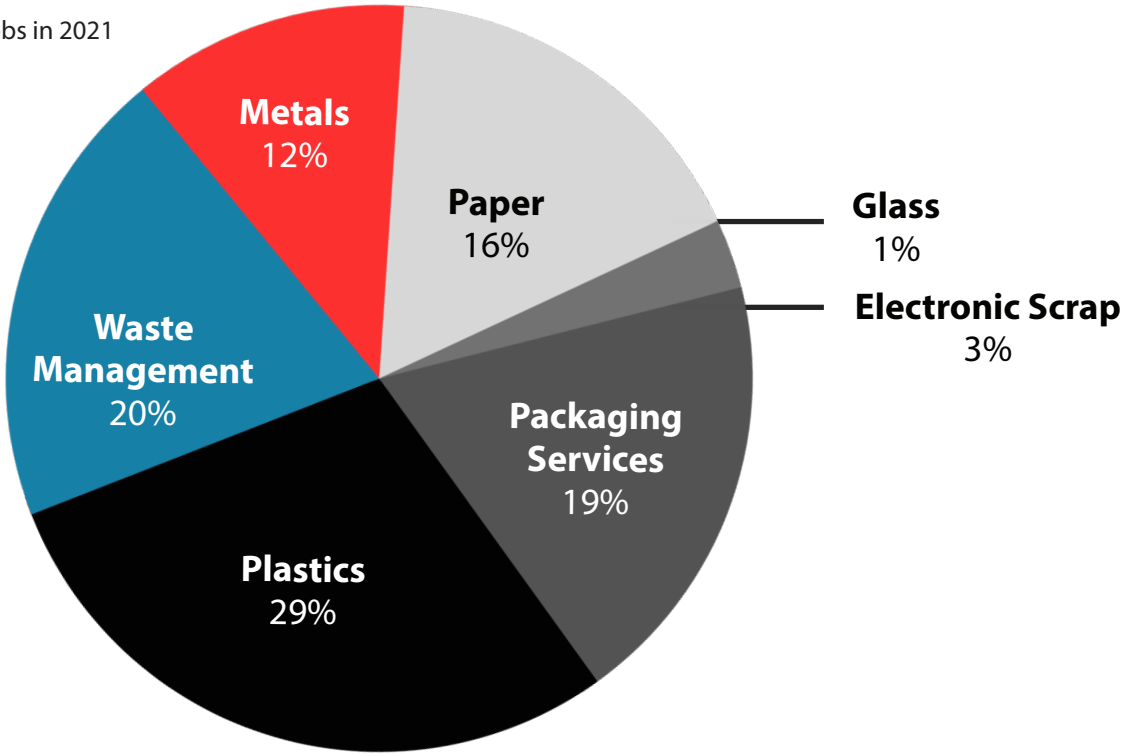


Figure 2
NAICS Industry Classifications

	NAICS	Industry
Plastics	325991	Custom compounding of purchased resins
	32619	Other plastics product manufacturing
	326160	Plastics bottle manufacturing
	326140	Polystyrene foam product manufacturing
Paper	32211	Corrugated and solid fiber box manufacturing
	322212	Folded paperboard box manufacturing
	322299	Other converted paper product manufacturing
	322219	Other paperboard container manufacturing
	322121	Paper (except newsprint) mills
	322110	Pulp mills
Glass	327213	Glass container manufacturing
Metals	331315	Aluminum sheet plate & foil manufacturing
	331110	Iron & steel mills & ferroalloy manufacturing
	332431	Metal can manufacturing
	331491	Nonferrous metal, except copper and aluminum shaping
	331318	Other aluminum rolling, drawing, extruding
	331492	Secondary processing of other nonferrous
	331314	Secondary smelting and alloying of aluminum
Waste Management	562920	Materials recovery facilities
	423930	Recyclable material merchant wholesalers
	56211	Solid waste collection
Packaging Services	561990	All other support services
	561910	Packaging & labeling services
Electronic Scrap	811212	Computer & office machine repair

After establishing the breakdown of recyclable material to be included within the scope, the study then dug into the patterns across these materials within the 19 different states who either have their own state recycling market development program or are part of a regional effort – versus states that did not have any documented recycling market development programs.

Note that this list is not inclusive of all recent programs, nor of regional efforts. Rather, it reflects those programs with whom we were able to connect with and gain approval for the evaluation. Newer recycling market development programs like those recently established in New Jersey and Maryland were not captured as part of that initial 19 programs.

Figure 3
States with a Relationship to a Recycling Market Center Included within the Study

State	Scope
Alabama	Regional (SERDC)
Arizona	Phoenix Initiative
Arkansas	Regional (SERDC)
California	Statewide
Florida	Regional (SERDC)
Georgia	Regional (SERDC)
Indiana	Statewide
Kentucky	Regional (SERDC)
Louisiana	Regional (SERDC)
Michigan	Statewide
Minnesota	Statewide
North Carolina	Regional (SERDC)
Pennsylvania	Statewide
South Carolina	Regional (SERDC)
Tennessee	Regional (SERDC)
Texas	City (Austin)
Virginia	Regional (SERDC)
Washington	Statewide

Data was requested on the year each program was established and annual staffing and budgets for every year in operation. In most cases, this data was not available. This lack of data restricted the ability to allow for detailed analysis of the size, budget and operational characteristics of different state recycling market centers, an original objective of this study.

Data

To determine how the development of recycling market centers (RMCs) has influenced job growth, JDA constructed and tested a series of econometric models based on available data. These data included 45 different variables in 4 categories.

Econometric models are used to help determine linkages between different variables and effects in the economy. In this case, the goal of the model is to determine if the establishment of an RMC in a state is correlated with employment growth in select recycling dependent industries (Table 2). The specific tool used to conduct the analysis is a regression model.[3]

In this analysis, JDA calculated dozens of different models utilizing four different techniques. These were:

1. **Multiple Linear Regression:** Uses several explanatory variables to predict the outcome of a specific indicator. Multiple linear regression models the linear relationship between the variables.
2. **Fixed Effects Models:** A form of a regression model in which the magnitude of the regression model is allowed to vary freely across individuals or groups. It controls for any state-specific attributes that do not vary across time.
3. **Log/Linear Regression Models:** In a log-linear regression the indicator is a product, instead of a sum, of explanatory variables.
4. **Arellano-Bond Dynamic Panel-data Estimation:** The Arellano–Bond model is specified as a system of equations (one per time period), where the factors applicable to each period differ.

Conducting these studies, it was determined that the dynamic panel-data estimation models provided the best results, particularly considering the sparsity of data on the RMCs themselves.[4] This allows for the key explanatory variable (in this case the existence of an RMC) to be independently isolated from other effects that might be endogenous to the individual states. For example, the model might show a strong relationship between the existence of RMCs and a particular industry; however, once the dummy is removed from the equation, the actual results might not vary. This would mean that state specific effects, or other control variables, are what is causing the relationships, not the existence of the RMC.

[3] A regression model uses specific statistical processes to estimate relationships between different variables. These models can take a wide number of forms, the most common of which is called linear regression. Other model forms examine non-linear relationships (such as logarithmic regression) or use different forms of estimation.

Regression analysis helps to reveal relationships between the test variable (also called the dependent variable) and other factors. Note that this form of econometric analysis can only be used to infer correlation between these variables, not direct causal relationships. Further analysis is always necessary to interpret the relationships and to understand potential outcomes.

[4] While some RMCs did provide limited data on the size and scope of their operations, these data were spotty and did not cover all years for which each RMC was in existence. These data were therefore not considered in the analysis.

General Economic Data

Economic variables were used to control for any changes to general economic conditions that might impact employment in the 24 recycling dependent industries. This was needed to help separate out the impact of the establishment and operation of an RMC. To control for general employment levels, the state unemployment rate was added, as was the labor force participation rate. A state with higher unemployment would be expected to have a lower number of jobs not only at recycling dependent firms, but across the board.

The overall population of the state was included to control for size. A state like Florida, with a population of 22.2 million, would be expected to have more employment across most industries than would a state like Wyoming with only 581,400 individuals. The Gross State Product per capita as estimated by the U.S. Department of Commerce, Bureau of Economic Analysis was also included. This would control for a more or less prosperous state, something that may impact the location of recycling dependent industries.

RMC Variables

Limited data were available related to the RMCs other than the state or locality covered and the year established. Where available, data on the number of employees and the RMC budget were included in the analysis; however, since these data were not available as a time series, individual scaler variables were included in each year, effectively making these also dummy variables.

Depending on the model specification, variables were also lagged for 1 to 3 years reflecting the ramp up period for any new firms or establishments. They were also logged to examine percentage changes rather than relative changes. Data were gathered for the period from 2010 to 2021, by state.

Economic Impact

Overall, the analysis suggests that recycling market centers are associated with a total of nearly 260,000 full-time equivalent (FTE) jobs over the past 33 years.[5] Once in-state supplier and induced impacts are included, over 990,000 FTE jobs have been created during the same period. Industries experiencing the most job development are concentrated in the waste management sector (specifically material recovery facilities – MRFs) as well as in many metals-related industries. Other significant beneficiaries of recycling market centers are electronics recycling, as well as various paper related industries.

Although there were challenges accessing annual budgets for many of the states, it was possible to analyze one year of budget across seven different programs. The data collected indicated that a larger budget for a state recycling market center does lead to more job creation. **For every $100,000 added to the budget of a recycling market center, jobs in recycling related industries had a 0.08 percent higher compound annual growth rate (CAGR) in jobs per capita.** In a state with 10 million residents, this would equate to 7,760 jobs in these industries.

Note: This is based in extremely limited data, and R-squared statistics is low (only 10%) meaning that the budget explains just 10 percent of the difference in job growth rate for these seven states.

[5]Note that in this instance "jobs" represents 1 FTE job over one year.

Figure 4

Economic Impact of Recycling Market Center over 33-Year

Direct Impact	Job ($)	Wage ($)	Output ($)
Paper	12,662	1,177,301,728	6,783,409,891
Plastics	1,334	109,345,485	558,358,269
Metal	28,393	3,697,668,812	31,115,320,163
E-Rcycling	44,694	3,545,247,233	7,037,231,565
MRFS	172,452	13,624,817,950	44,048,518,433
Subtotal	259,535	22,154,381,209	89,542,838,321
Supplier Impacts	159,911	12,119,616,177	36,382,527,723
Induced Impacts	571,879	43,546,246,488	153,971,875,159
Total Impacts	991,325	77,820,243,873	279,897,241,203

Over the 33-year period, those direct impact businesses have paid their employees' wages and benefits totaling nearly $22.2 billion (2022 dollars) and have generated economic activity of over $89.5 billion.

Other firms impact industry as suppliers. These firms produce and sell a broad range of items including machinery, trucks, fuel, office supplies and bailing wire. In addition, supplier firms provide a broad range of services, including personnel services, financial services, advertising services, consulting services or transportation services. Finally, many people are employed in government enterprises responsible for the regulation of the various components of the industry.

All told, the models suggest that over the 33-year period, about 159,900 supplier impact job years of employment are associated with the recycling market generating, over $12.1 billion in additional wages and benefits and almost $36.4 billion in economic activity (again in 2022 dollars).

Over the last 33-years, the induced impact of the industry, support jobs like real estate, education, restaurants, etc., is about $154.0 billion and generated 571,880 jobs paying over $43.5 billion in wages and benefits.

Impact by Material Sector

While the economic impact of the recycling market centers as a whole proves beneficial, when impact was assessed by material sectors, the results were far more variable. According to the analysis, of the 24 industries examined, job growth in nine was positively correlated with the establishment of a recycling market development program in the state, while four industries had a negative correlation. The range of correlation suggests that job growth of between 5 percent up to over 100 percent is associated with recycling market centers.

Figure 5
Industries Positively Correlated with Establishment of a Recycling Market Center

Industry	Percent Difference
Iron and Steel Mills	82.30%
Materials Recovery Facilities	106.1%
Computer Repair	38.80%
Other Paperboard Container Mfg	22.60%
Rolling and Extruding Mills	11.30%
Plastic Bottle Manufacturing	10.50%
(Converted Paper Products Mfg.	6.80%
Secondary Processing Nonferrous	7.90%
Aluminum Plate/Foil Mfg.	5.10%
Secondary Aluminum Smelting	-11.10%
Polystyrene Manufacturing	-40.90%
Corrugated and Fiber Box Mfg.	-12.10%
Other Business Support Services	-46.90%

Some of these results would be expected. Recycling market centers would be closely related to the development of recyclable feedstock, so one would expect a large correlation with MRFs. Paper manufacturing, paperboard container manufacturing and converted paper products manufacturing consume large amounts of recyclable paper and it is logical that they would be in states where feedstock sources are most secure.

A big surprise is the large correlation between recycling market centers and steel mills. These are extremely capital-intensive facilities, and one might think that other forces would be more important in determining their location. However, newer primary and secondary metals production facilities rely on substantial amounts of recyclable feedstock, so like paper manufacturers, it is reasonable to presume that electric arc steel mills would tend to locate in states with recycling market centers.

Additionally, it was surprising to see a negative correlation for corrugated box manufacturing – something one might think would be associated with the other paper industries examined in the model.[6] Note that since 2021, several new investments into domestic corrugated manufacturing facilities have been announced, so in a few years this correlation may have changed. Most of those new facility announcements are in the states listed within this study, although their establishment in affiliated states can't be definitively linked to the presence of an RMC without directly surveying those companies.

Overall, it appears that the establishment of a recycling market center does have a beneficial effect on recycling related industries in a state's economy.

Case Study: Pennsylvania Recycling Markets Center

The Pennsylvania Recycling Markets Center focuses on the development and expansion of recycling markets in the state. The center serves as a keystone clearinghouse of environmental, economic development, and manufacturing resources for end use support of recycled commodities and products.

The Center is headquartered at Penn State Harrisburg so they can partner with the University to support market innovation and research.

A recent analysis on the Center's impact demonstrates that wages within the organizations associated with the Center are an average 23% higher than the state average, indicating recycling industries can offer highly skilled technical employment.

Analysis – Size

A cursory examination of the data shows historically that states with RMC programs had consistently fewer jobs per capita in the 24 industries examined in this study, though the difference has been falling.[7] It is doubtful that these states are less accepting of recycling and may be more a reflection of the industries chosen for analysis, many of which are in heavy manufacturing sectors.

As of 2021, the states evaluated that are associated with a recycling market center account for 61.3 percent of the total U.S. population and 59.1 percent of the Gross Domestic Product (GDP).[8] This indicates that interest in recycling market centers correlate with business concentration. States that have higher populations and waste, as well as robust manufacturing industries, appear more interested in investment in recycling market development than those who are more rural.

[6]The preciseness in the model here is lacking somewhat and corrugated and fiber box manufacturing just barely reached the cutoff point for significance selected.

[7]Employment data are from Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW), at: https://www.bls.gov/cew/data.htm

[8] For the purposes of measuring program size, we removed collective state programs like NERC and SERDC Had this analysis included the NERC states, these numbers would have been significantly higher.

Figure 6
Recycling Market Center Coverage by Gross Domestic Product

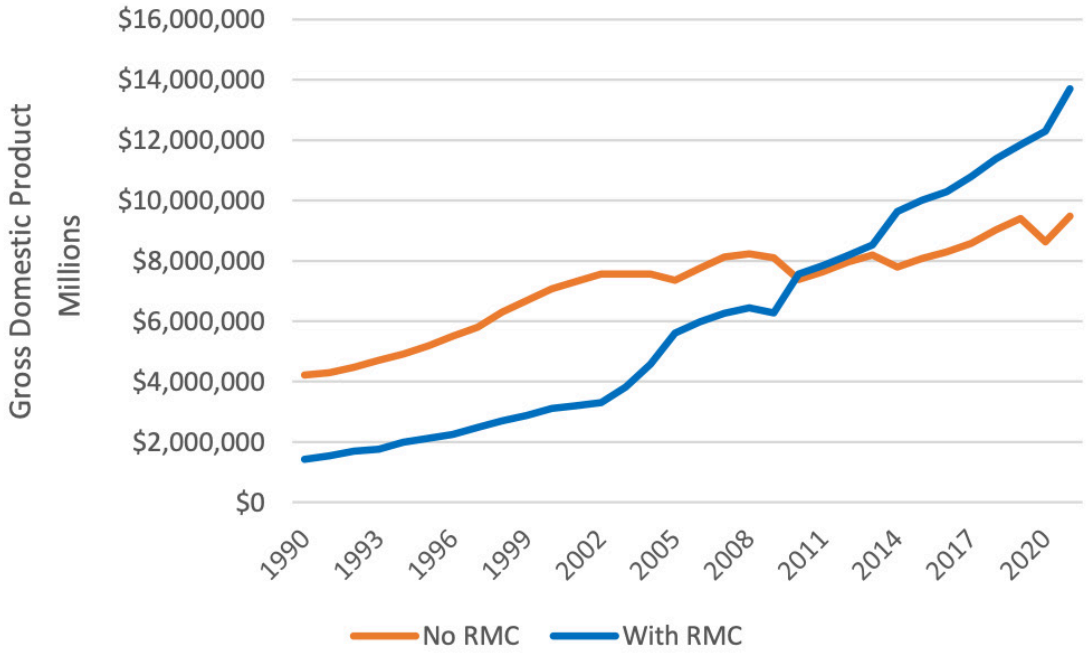
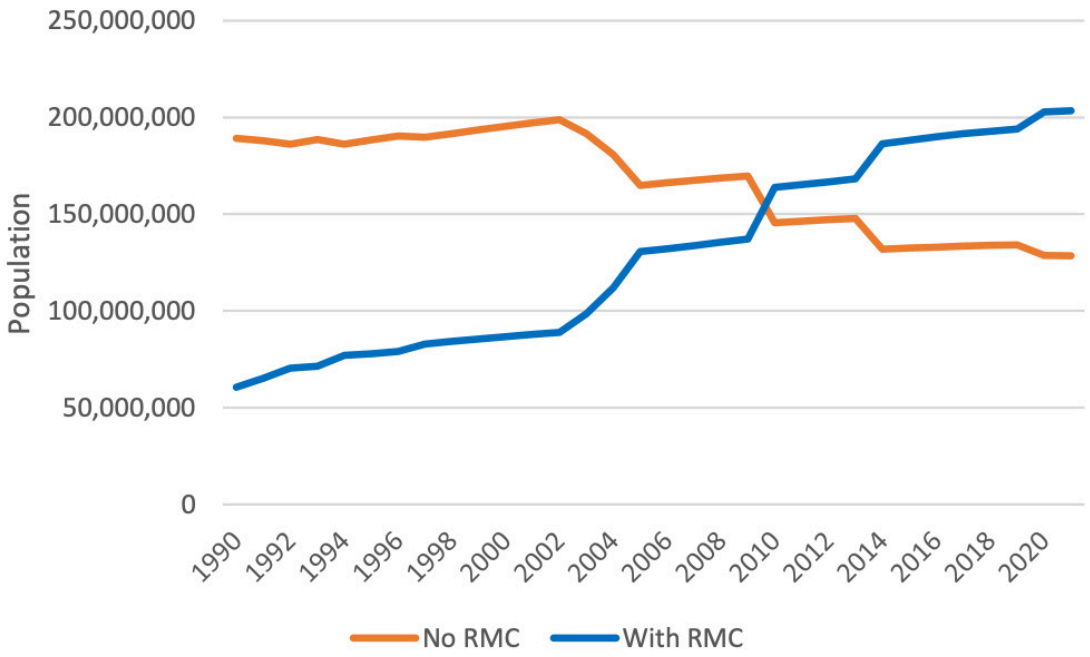


Figure 7
Recycling Market Center Coverage by Gross Domestic Product

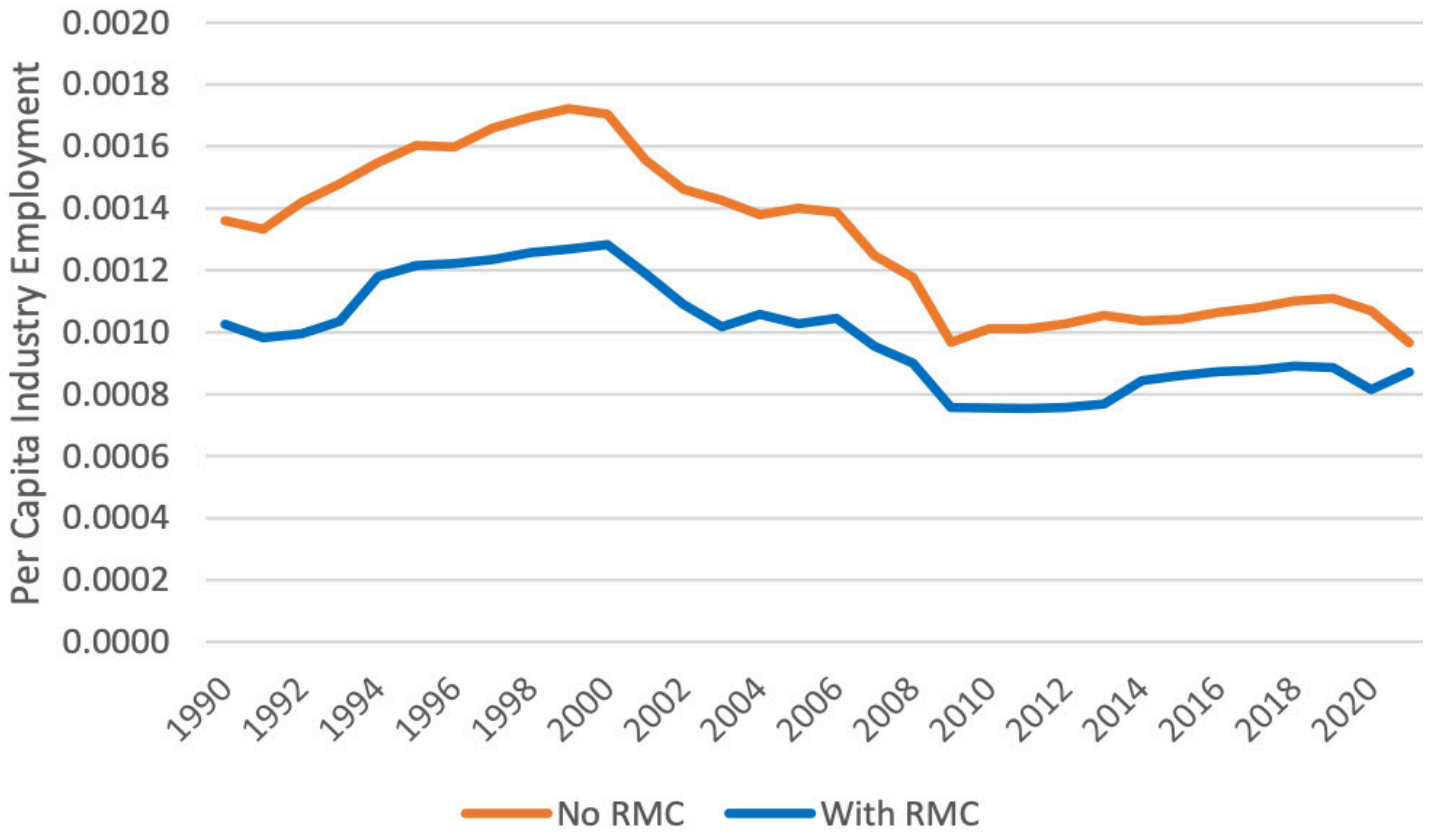


This reversal in the graphs occurring around 2008 seems to indicate that states investing in recycling market development have overtaken states that have not in terms of jobs and GDP growth. This does not mean to imply that these states are creating more jobs through recycling market centers, but rather infers that investment into these programs is following the concentration of waste and industry. This suggests there may be an opportunity for these programs to focus on regional needs and strengths while establishing partnerships between manufacturers and waste generated.

Analysis – Recycling Market Center Impact on the Recycling Sector

While a distinct correlation between state employment rates and the presence of a recycling market center can't be provided, Figure 4 shows that as states support recycling market centers, the level of employment in the 24 recycling dependent industries examined in the study has risen relative to states without programs

Figure 8
Recycling Dependent Jobs Per Capita



Recycling industry jobs per capita across states depend on a variety of factors, many of which are historical. For example, much of the iron and steel industry is based in the Great Lakes region as it was once necessary to move large quantities of iron ore from mines in Minnesota and coal from Pennsylvania and West Virginia to a central location.

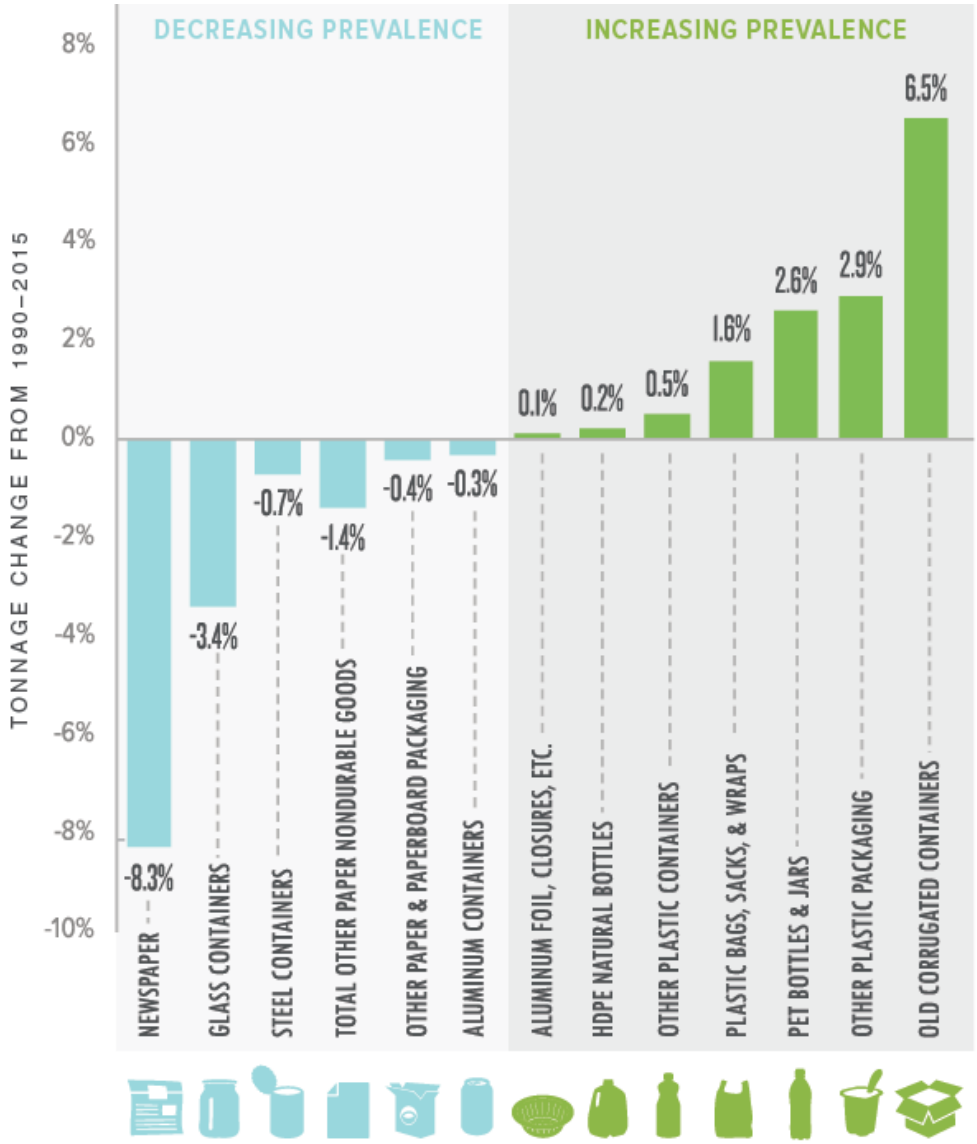
Historically, the states that have not put recycling market centers in place have had a higher share of recycling industry jobs per capita than those that have enacted these programs. **Over time, however, the differential has closed, suggesting that states who support recycling market centers are becoming more desirable locations for recycling industry facilities.**

Analysis – Material Specific Impacts of Recycling Market Centers

One of the arguments frequently promoted for increased recycling investment is the rapidly changing material stream. Materials that were widely used, and recyclable in the 1990s have shifted over time as industries have innovated. Paper demand has decreased as society has shifted to reading their news online, plastics has grown and replaced several materials over time. Recycling systems, originally designed in the 1990s, are now outdated, with many lacking the means to process increased plastics, lighter weight materials and new packaging formats. Developing end markets and supporting shifts to sorting and reprocessing so the quality of recyclable feedstock remains high will be a continued need as long as innovation remains central to business.

Figure 5

Evolving Ton: Shift in Recyclables Over 25 years[9]

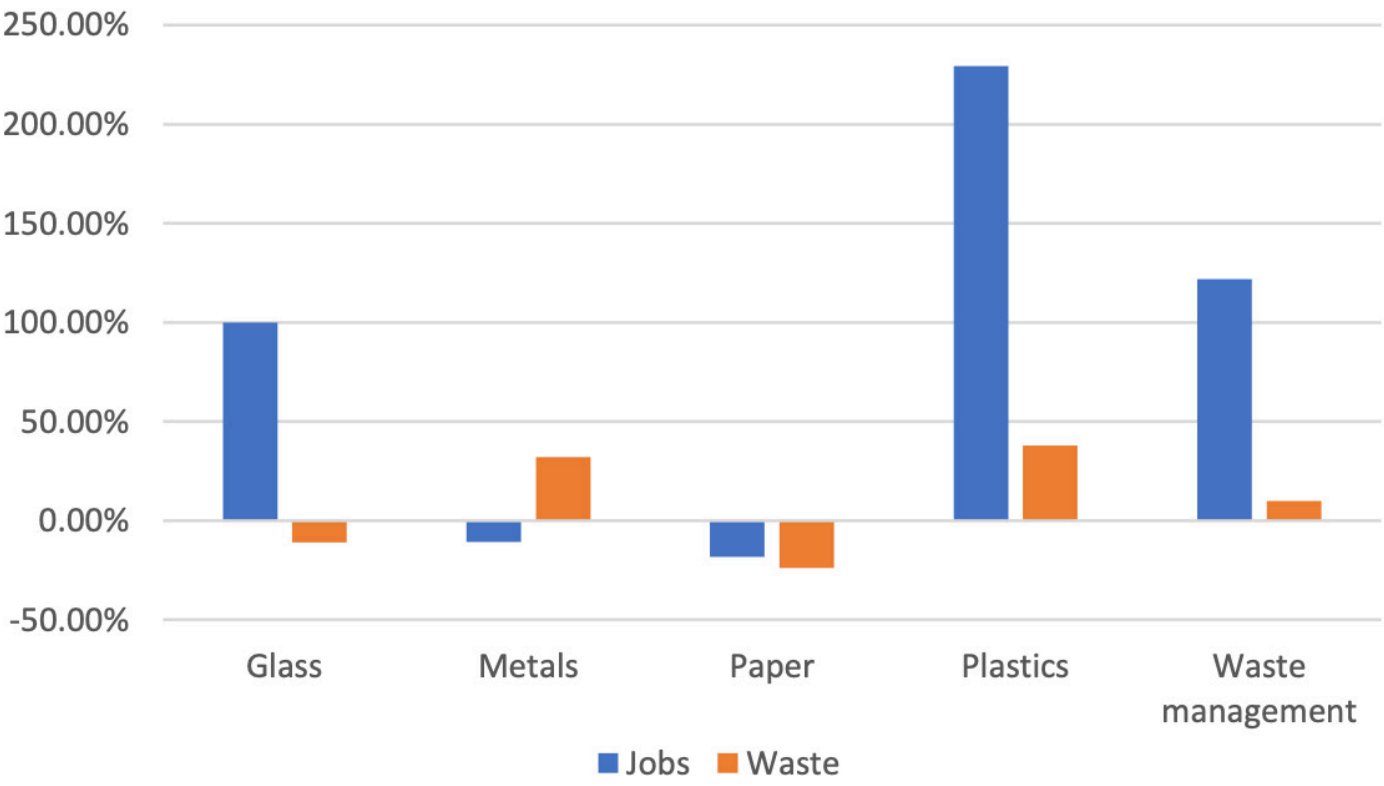


[9]Figure created by Resource Recycling Systems (RRS).

Because recycling market centers would be at the intersection of this shift, helping to guide, invest and support research on these shifting materials, the study evaluated the growth of jobs in the material specific sectors within states that support recycling market centers against the shift in waste. The data indicates that job growth is, for the most part, correlating with the shift in curbside recyclables. Although not the highest employer, the greatest areas of job growth is in plastics, which also coincides with some of the fastest growing recyclable streams. It would be interesting to study this against state recycling market center budgets to see how much they allocate to material-specific or packaging format-specific efforts.

Figure 6

Changes in Recycling Jobs and Waste Stream (2000 to 2017)



Better Data is Needed

While it appears that recycling market centers correlate with increased direct and indirect job creation in recycling related industries, exactly how programs were modeled, what their impact on specific materials is or what size budget is most effective was unavailable. Looking at state specific studies gains greater insight, but the data needed to understand what specific actions could be taken to help advance material specific goals is still lacking.

AMERIPEN began direct work with state recycling market development centers in 2020 because it saw the need to grow end markets for packaging recovery. These centers do not work solely on packaging, but they can be valued partners in helping to meet these goals.

Many of these programs work directly with industry, seeking to match need with opportunity. They can do this through material marketplaces, regional workshops, or acceleration programs. Note that in a few cases, these programs have been established explicitly to meet a state concern with materials management.[10] But better data is needed to help track and evaluate program impacts on material goals.

For example, one of the first studies AMERIPEN undertook with the state recycling market development center task force group was an assessment of corporate goals for use of recyclable content and what degree of supply and capacity existed within the U.S. to help the industry realize those goals. A simplified summary of that study indicated that the U.S. lacks the supply and domestic capacity to meet demand. This infers that policies like recycled content mandates will not create success unless investments are also made in the infrastructure needed to match recycled content to mandates. States that have recycling market centers and recycled content mandates could focus on those material specific industries and match businesses with recycled content providers to ensure mandates are successful. Capturing data to track supply, capacity and demand before and after the mandate and the investments made may provide further insight into programmatic success.

Case Study: MBOLD

From food packaging to pallet wrap, single-use shopping bags and hay-bale wrap, the U.S. economy uses more than 12 billion pounds of flexible packaging and film every year – but only 5% of it currently gets recycled.[10] MBOLD is tackling this challenge through a groundbreaking collaboration in Minnesota. The initiative includes a joint $9.2 million equity investment in film recycler Myplas USA by lead investors General Mills, Schwan's Company and Wisconsin Charter Next Generation, and supporting investors Target and Ecolab. Myplas will establish a state-of-the-art flexible-film recycling plant and its U.S. headquarters in Rogers, Minnesota. Slated to begin operations in 2023, this new 170,000-square-foot mechanical recycling plant aims to recycle nearly 90 million pounds of low- and high-density polyethylene packaging and film annually at full capacity.

While the MBOLD investment is all private investment, members are quick to point to Minnesota's Recycling Market Development Center for their help in introducing them to Myplas and their assistance with site location and regulatory needs.

[10]Information obtained from MBOLD website.

Recycling Market Centers Can Play a Valuable Role with Industry Investment

Some have argued that industry should be responsible for the costs associated with material recovery and recycling and that it is not the role of state and local government. There is increasing interest in legislation to adopt extended producer responsibility (EPR) models for packaging. Many states now have EPR programs in place for electronics, and in addition to producer responsibility organizations for electronics investing into the recycling systems, recycling market centers have also played an instrumental role in helping the electronics industry grow end markets, access technical resources and navigate financial and regulatory needs. These types of resources are likely to to be of value for packaging as well.

The ability for recycling market centers to serve as a central clearinghouse for technical and business knowledge, to help coordinate between state commerce and environmental agencies and to help link business with tools and partners, is a unique skill set that will help industry while legislation might also encourage increased industry investment into recovery through other means such as EPR.

"Collaboration is a cornerstone of the Carton Council strategy and has been since we were founded. A rising tide lifts all boats is a common phrase but one that is true as we work with other organizations who share our commitment to improving recycling. Our efforts all go further when we work together to help improve the recycling system. Recycling Market Development Centers have been key partners in our decade long effort to increase carton recycling in the US. We believe these partnerships will continue to be of value as the packaging industry gets more engaged in recycling through extended producer responsibility legislation."

— **Jason Pelz**
Vice President – Recycling Projects
Carton Council of North America

Next Steps

This analysis was dependent on the data made available from existing state recycling market centers, often supported by government through different grants and budgetary line items. While this analysis shows a positive impact of recycling market centers over time, it is not correlated with the budgetary expenditures and staffing effort put into them. Without knowing data related to the size and scope of the programs offered by each state recycling market center, and the industries that they are targeting in each state, it is impossible to determine the nuances behind program success. For example, it is currently unknown if budget matters, if programs are targeting certain materials, etc.

If more information on the characteristics of these operations were to be made available, it might be possible to determine best practices and how other industries might benefit from the state recycling market centers.

There are many different models of recycling market development: state agency collaborations (the focus of this study), privately funded collaboratives, informal working networks, and more. There may be a need to help coordinate and coalesce these efforts further to advance regional or national system interventions and investments. The recent re-invigoration of recycling market development work at the EPA indicates they could play that role. But to ensure resources are dedicated to activities that have the greatest impact, AMERIPEN encourages a working collaborative of stakeholders involved in recycling market development coalesce to help collect the necessary data and standardize the method of assessment so we can evaluate the impact investment into these programs is having and if there are more effective mechanisms between the variety of models currently employed.

"Pratt Industries' emergence as a leader in the recycled paper packaging industry is directly tied to unparalleled investment in infrastructure and technology, including the operation of five - soon to be six - of the most modern 100 percent recycled paper mills in the nation. In what is truly a circular business model, Pratt meets the needs of its customers through an integration of recovery, sorting, manufacturing, converting, customization, and delivery capabilities. While paper recycling is one of America's great environmental achievements, there is always more to be done. Collaboration and continued innovations throughout the supply chain from collection, to sorting and manufacturing, recycling market development is needed, and Recycling Market Development Centers are valued partners as in supporting recycling in the U.S."

Cathy Foley
Executive Vice President – Industry Relations and Supply Chain
Pratt Industries

Conclusions

Based on a thorough analysis of available data, development of state recycling market centers has helped states to attract recycling businesses, particularly sectors like paper and paperboard manufacturing, and metals smelting and production. This suggests that much like other economic development programs at the state level, assistance such as grants, tax forgiveness, technical services and research and development can help encourage recycling dependent businesses to locate in specific areas, particularly those industries at the margin.

As materials and sectors seek to advance circularity, state recycling market development centers offer a unique skill set that matches state resources with private interests to advance an industry. When these centers collaborate with industry to drive resources to areas of need, we can collectively benefit.

"Increasing the recovery of plastic flexible film is a key objective for General Mills' packaging team. Working with regional stakeholders, including our local recycling market center we were successful in creating and funding the MBOLD collaborative to increase the recovery of flexible films in the Midwest, an area that has, until now, lacked regional capacity to recycle flexible films. As the packaging industry works towards increased circularity, working with state partners to provide the technical support, economic incentives and regulatory direction to support recycling innovation is a value-added service that will help create robust domestic markets for recycled good while reducing our collective environmental impact. It's a win-win for all."

— Lee Anderson
Vice President – Government and Public Affairs
General Mills

DISCLAIMER

This analysis was prepared for AMERIPEN by John Dunham & Associates, based on inputs from the client. All care was taken to ensure that the analysis was properly conducted based on data available at the time of its completion. Any errors are our own.

AMERIPEN®

ABOUT JOHN DUNHAM & ASSOCIATES

John Dunham and Associates (JDA) is a leading economic consulting firm specializing in the economics of fast-moving issues. JDA is an expert at translating complex economic concepts into clear, easily understandable messages that can be transmitted to any audience. Our company's clients include a wide variety of businesses and organizations, including some of the largest companies in America.

John Dunham is a professional economist with over 30 years of experience. He holds a Master of Arts degree in Economics from the New School for Social Research as well as a Master of Business Administration from Columbia University. He also has a professional certificate in Logistics from New York University. Mr. Dunham has worked as a manager and an analyst in both the public and private sectors. He has experience in conducting cost-benefit modeling, industry analysis, transportation analysis, economic research, and tax and fiscal analysis. As the Chief Domestic Economist for Philip Morris, he developed tax analysis programs, increased cost-center productivity, and created economic research operations. He has presented testimony on economic and technical issues in federal court and before federal and state agencies.

ABOUT AMERIPEN

AMERIPEN – the American Institute for Packaging and the Environment – is a coalition of stakeholders dedicated to improving packaging and the environment. It is the only material inclusive packaging association in the United States representing the entire packaging supply chain, including materials suppliers, packaging producers, consumer packaged goods companies and end-of-life materials managers.

AMERIPEN focuses on science and data to define and support its public policy positions and those positions are accordingly based on rigorous research rooted in a commitment to achieve sustainable packaging, and effective and efficient packaging recovery and recycling policies.

The U.S. packaging industry contributes $537.91 billion in total economic output to the national economy and is responsible for nearly 1.7 million jobs. These workers earn over $117.73 billion in wages and benefits, and members of the industry and their employees pay $43.46 billion in direct federal, state, and local taxes.

AMERIPEN
1350 Main Street, Ste. 1100 Springfield,
MA 01103
413.686.9198
info@ameripen.org